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Problems with the U.S. Department of Energy Yucca Mountain Environmental Impact Statement

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Comments on the Draft Environmental Impact Statement for a Geological Repository for the Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste at Yucca Mountain, Nye County, Nevada

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- 1 The U.S. Department of Energy (DOE) asserts in their Draft Environmental Impact Statement (DEIS) for the Yucca Mountain Repository Project that, "The analyses in this EIS did not identify any potential environmental impacts that would be a basis for not proceeding with the Proposed Action." (DEIS, 1999, 2-87) Based on this conclusion the DOE proposes to proceed with the construction of the radioactive waste repository at Yucca Mountain. There is sufficient evidence available in the EIS, however, to conclude that the DOE did not find significant potential environmental impacts due to a high degree of uncertainty and error in the DEIS.

The DOE cites four key attributes of the repository safety strategy:

- Limited water contacting waste package
- Long waste package lifetime
- Slow release of radionuclides from the waste
- Reduction in the concentration of radionuclides and chemically toxic material during transport from the waste to a point of human exposure

All parts of the safety strategy are highly uncertain, if not impossible to estimate based on the data provided in the report.

- 2... First, the threat of human exposure through groundwater contamination was not accurately assessed because the scientists involved failed to include the possibility of a dramatic climate change raising the water table. In the climate models simulated, only three possible climates were analyzed (DEIS, 1999, 5-9). No mention was made of a dramatic climate shift which could possibly raise the water table level from its current depth of 600 m to near 300 m, the location of the waste packages. This possibility directly negates the EIS conclusion that limited water would contact the waste packages.

- 3 Second, the DEIS includes the statement that the "most important process controlling waste package lifetime is whether water would drip from the seeps onto a waste package." (DEIS, 1999, 5-11). On the previous page of the DEIS, the statement is made that, "After the water returned to the repository walls, it would drip into the repository but only in relatively few places. The number of seeps that could occur and the amount of water that would be available to drip would be restricted by the low rate at which water flows through Yucca Mountain." (DEIS, 1999, 5-10) As was previously mentioned, a climate shift could cause a dramatic increase in the water that flows through Yucca Mountain to the repository. In addition, the flow of water through this area is affected by the surrounding geologic conditions, which are uncertain, by the DOE's own admission. On page 5-10 (DEIS, 1999), the DOE admits that the effect of heat (which could arise 15-25 years after closure of the repository as a result of the decay of nuclear materials, or as a result of volcanic activity in the surrounding area) on the water flow and geologic conditions is unknown. The DOE is planning future studies to determine the effect of heat on repository conditions (DEIS, 1999, 5-18), but until that data is known, the DOE's claim that little water would seep into the repository and cause damage to the waste packages is weakened by inconsistency.
- 4 Another uncertainty in the DEIS claim of waste package safety is the DOE's admission that the design for these waste packages is yet unknown (DEIS, 1999, 2-32). How, then, can the DOE assure long waste package lifetime when the design for these waste packages has yet to be determined. Essentially, the DEIS has made a statement implying the safety of the waste packages when in reality the variables affecting waste package lifetime are admittedly uncertain. Until the effect of heat on repository conditions can be estimated and the design of the waste packages known, no logical statement can be made about the lifetime of the waste packages.

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Third, the rate of release of radionuclides from the waste packages would be determined by the design of the packages and the amount of water contact with the packages. As previously stated, both of these factors are admitted by the DOE to be unknown. If water contact with the packages were to increase beyond the DEIS estimation, the release of radionuclides would also increase. Therefore, the DEIS statement of slow release of radionuclides from the packages is unsupported.

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The fourth aspect of the DEIS safety strategy is uncertain as well. The scientist involved insist that by the time a large portion of the radioactive material in the waste packages could reach groundwater supplies, their concentration would be non-toxic. The non-toxicity of these levels of groundwater contamination is not an assurance that they would not still be detrimental to humans. Furthermore, if the water table were to rise or if the water flow in the area surrounding the repository were to change as a result of heat, the concentrations of radioactive materials contaminating groundwater supplies could also increase. It is likely, if this were to occur, that the concentration of radioactive materials in groundwater would reach toxic levels.

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Beyond the uncertainty of the above four DEIS claims, there is fundamental error in the modeling done by the DOE to assess the environmental consequences of volcanism, seismicity, and human intrusion. In modeling the possible consequences of these events, the DOE has assumed that only one of these will occur at a time. In other words, the simulations used to assess the environmental impact of these occurrences do not consider the possibility of an earthquake and a volcanic eruption at the same time. The DOE admits the likelihood of a thermal pulse 15-25 years after closure of the repository (DEIS, 1999, 5-10), along with high probability of seismic activity in the area (see 5-16, DEIS, 1999). Modeling the consequences of only one of these possibilities at a time, therefore, incompletely assesses possible environmental impacts.

Based on the above criticisms of the DEIS, the Yucca Mountain Repository should not be constructed until more information is available on the possible environmental impacts. The numerous unknown factors on page 5-18 (DEIS, 1999) need to be analyzed before the safety of the Yucca Mountain site can be judged. Moreover, following through with the Proposed Action in the face of such uncertainty would be ill-judged on the part of the DOE.

References

DEIS (1999), US Department of Energy, Draft Environmental Impact Statement for a Geological Repository for the Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste at Yucca Mountain, Nye County, Nevada, Vol. I, Impact Analyses, DOE/EIS-0250D, Washington, DC, US Government Printing Office.